Instrumentation for HEP, Argonne and LAPPD

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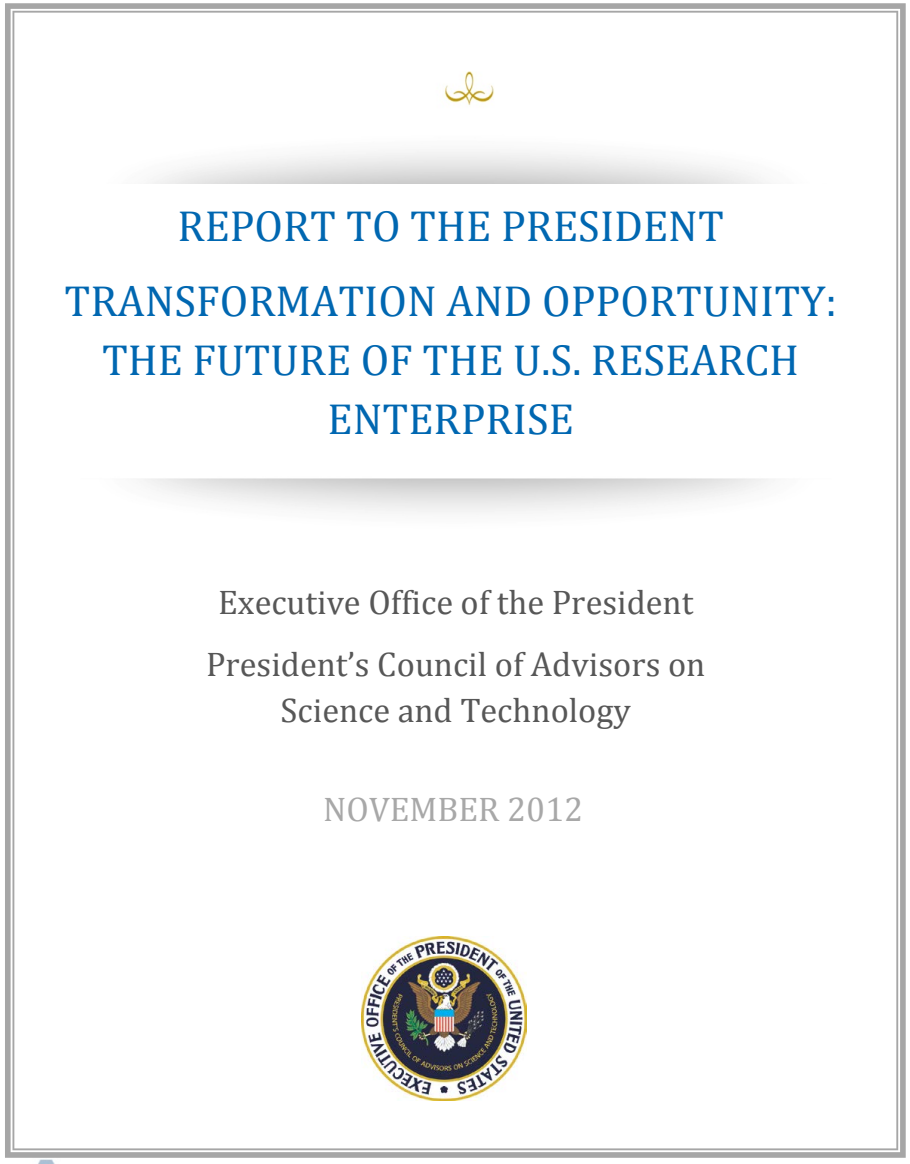
Role of Instrumentation



As a fraction of its gross domestic product, U.S. investment in research and development used to be first in the world. Today it is eighth.

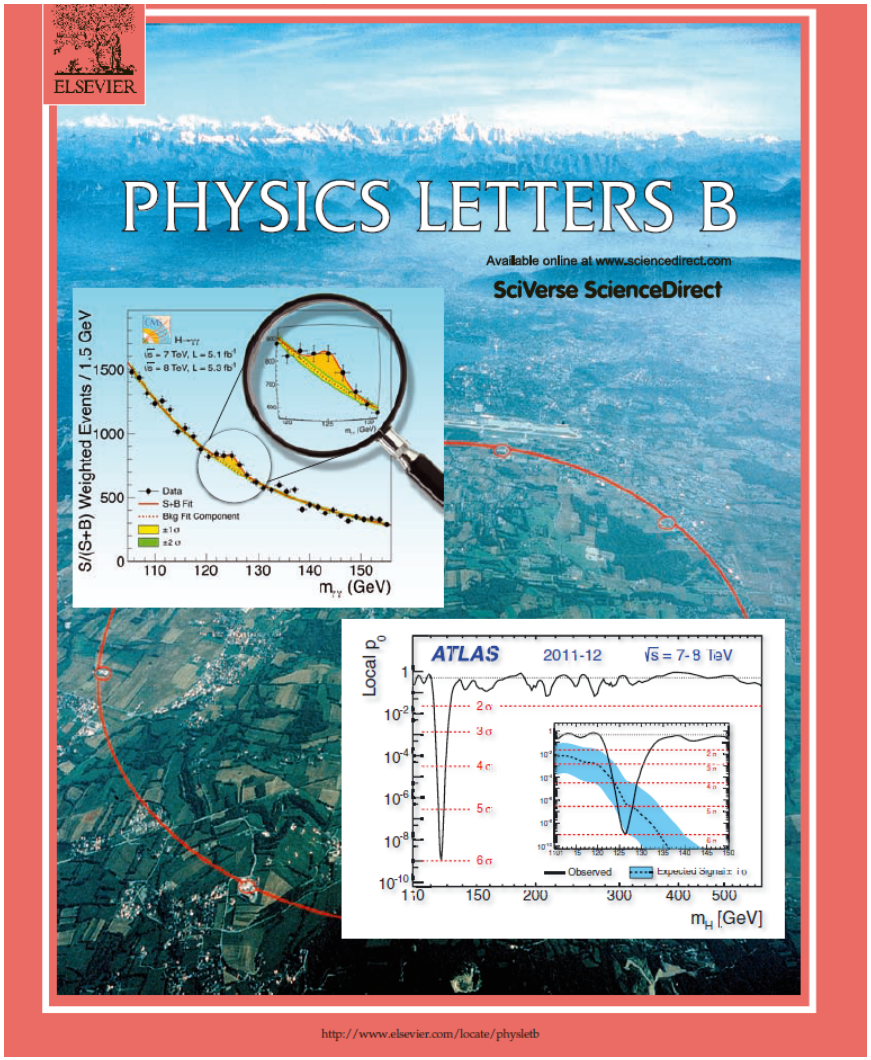
Basic research is the underlying platform on which applied research and engineering development are built

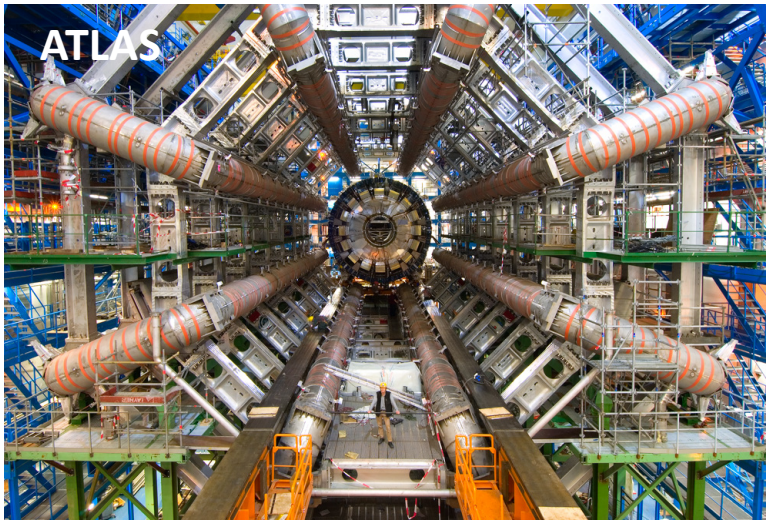
Goals:

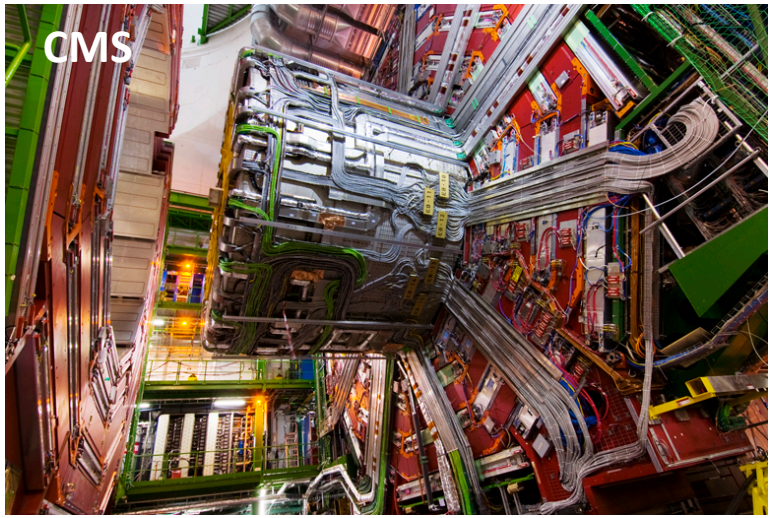
1) enhancing long-range U.S. investment in basic and early-stage applied research
2) reducing the barriers to the transformation of the results of that research into new products, industries, and jobs.

http://www.whitehouse.gov/administration/eop/ostp/pcast/docsreports

Triumphs of Instrumentation



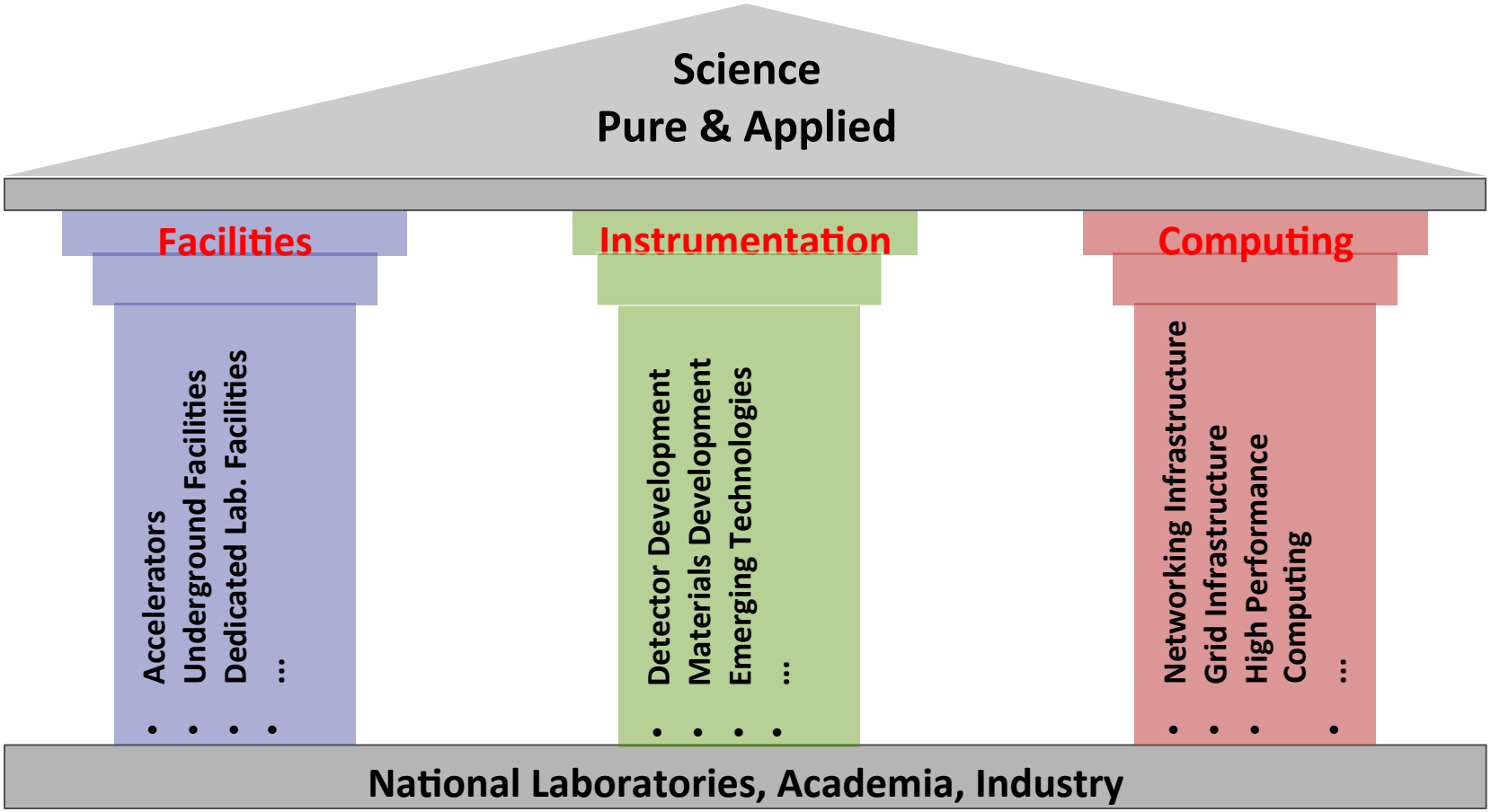




"First observations of a new particle in the search for the Standard Model Higgs boson at the LHC, July 4, 2012", Physics Letters B

Science Enablers

- Science is enabled through the availability of Facilities, Instrumentation and Computational infrastructure



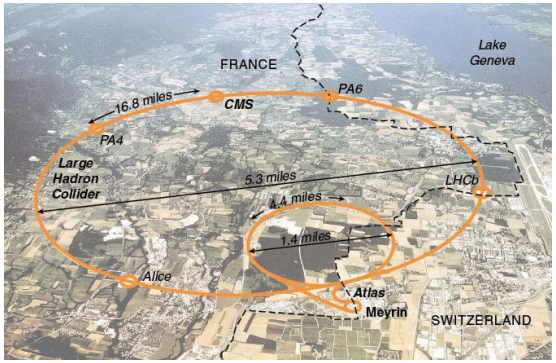
Status and Role of Instrumentation for HEP

Science

- The Physics Questions and Challenges are being well formulated by the three physics frontiers; Some questions posed already a long time ago (Higgs, 1964)

Facilities

- Existing facilities will have an extended life
- New facilities are costly; environment is very competitive

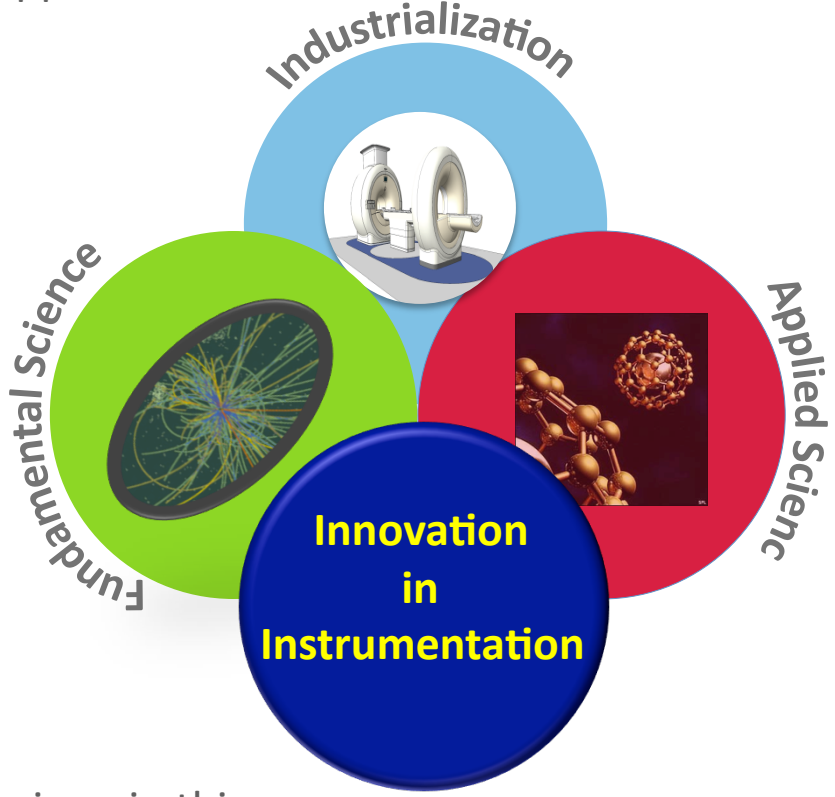


Instrumentation

- **Put differently: the field cannot afford to maintain the current status quo to have a well-balanced particle physics program**
- Cost-effective innovative techniques and technologies needed
- Instrumentation will have a tremendous impact on the future program

Cannot Be Risk Averse

- Innovation in instrumentation has been a hallmark of HEP with a singular focus
- Renewal of that investment for cost-effective HEP experiments in a modern context: using advances in other sciences for HEP and transferring knowledge to industry to broader societal application



- LAPPD program unique in this sense.

Argonne and LAPPD

- The field of HEP (and the nation) needs to invest in the development of new transformative technologies, combining advances in all areas of science and applying them to address prominent scientific questions

- The emphasis is on innovation, the search for radical solutions, by fundamentally reinventing technologies

"Multi-disciplinary is a really key missing part of society ..... We've gotten so good at getting deep ..... but don't know how to talk, let alone build anything together."

Interview of 'The Atlantic' with Joi Ito, director of MIT Media Lab, Sept. 13, 2011

- **Argonne, as a multi-disciplinary laboratory, is uniquely positioned to bring together different science disciplines on the development of instrumentation**
- **LAPPD program is, in some sense, our first poster child**

- We are looking forward to your feedback from this review